FIELD OPERATIONS WORK PLAN
FOR
MONSANTO CHEMICAL COMPANY
SODA SPRINGS, IDAHO

TDD No.: F10-8702-06

DUPLICATE

Report Prepared By: Ecology and Environment, Inc.
Date: September 1987

Submitted To: J.E. Osborn, Regional Project Manager
Field Operations and Technical Support Branch
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FIELD OPERATIONS WORK PLAN

PROJECT NAME: MONSANTO CHEMICAL COMPANY SITE INSPECTION
CONTRACT No.: 68-01-7347
TDD No.: F10-8702-06
DATE: SEPTEMBER 1987

ECOLOGY AND ENVIRONMENT, INC., SEATTLE

FIT-OM: David A Buecher DATE: 9/24/87

E&E PROJECT MANAGER: Jeff Whidden DATE: 9/24/87

QA OFFICE CONCURRENCE: Joyce Crosson DATE: 9/24/87

B.G. ESD PEER REVIEW: John E Osborn DATE: 9/24/87

PROJECT NO. ____________ ACCOUNT NO. ____________

LABORATORY DESIGNATED: ____________ EPA ______ CLP ______ PRIVATE

SAMPLE NUMBERS ASSIGNED: FROM ____________ TO ____________

SAMPLE CONTROL CENTER (ESD) : ____________ DATE: ________

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1.0 INTRODUCTION

Pursuant to U.S. Environmental Protection Agency (EPA) Contract Number 68-01-7347 and Technical Directive Document (TDD) Number F10-8702-06, Ecology and Environment, Inc. (E&E) is conducting a Site Inspection (SI) of the Monsanto Chemical Company's Elemental Phosphorous plant located in Soda Springs, Idaho.

The Monsanto plant produces elemental phosphorous from phosphate ore in an electric furnace. Elemental phosphorous is used in the manufacture of phosphoric acid, and in many other processes. The plant generates a number of solid and liquid waste streams which contain metals. Most wastes are stored on site in ponds or piles.

A hydrogeological investigation performed by Golder Associates in 1985 identified elevated concentrations of several metals in ground water underlying the site. Specific metals detected included cadmium, selenium and zinc. Golder concluded that wastes stored in the on-site ponds and an old hydro-clarifier were the sources of detected contaminants (1).

Because of the large quantities of waste generated and stored at the site, and sampling evidence that demonstrates ground water contamination with several hazardous substances, EPA is concerned about the potential for adverse impacts to local water supplies. This work plan describes the objectives and scope for a sampling investigation to address those concerns, and details the procedures to be followed during the performance of the field work.

As part of the investigation, water samples will be collected from on-site monitoring wells, production wells, an off site well, and a nearby spring. Additionally, grab samples of water and sediment will be collected from waste storage ponds at the facility. All samples will be analyzed for EPA Target Compound List (TCL) inorganic compounds (Appendix A), and selected anions that have been detected in past sampling programs at the facility. The production well samples and several other samples will additionally be analyzed for TCL organic compounds (Appendix A). Analytical data will be used to characterize hydrochemical conditions beneath the site and the immediate vicinity.

This sampling program is intended to verify contaminant concentrations reported during past sampling efforts. Results of the investigation will be used to help determine the need for additional work at the site.

2.0 PROJECT DESCRIPTION

2.1 Objectives and Scope

The objectives of the inspection are to:

- determine the presence and concentrations of TCL hazardous substances potentially in wastes stored in on-site ponds;

- o verify concentrations of EPA TCL compounds and selected ions previously identified in the ground water of the upper basalt zone aquifers; and

- o determine if there is a need for emergency action, or other less urgent action at the site.

To accomplish these objectives the following general field activities will be conducted:

- o collect samples from solid and liquid fractions of the on-site waste storage ponds;

- o collect ground water samples from selected existing monitoring and production wells on the site, and from a spring and well located downgradient from the site; and

- o analyze samples for EPA TCL compounds and selected ions.

2.2 Site Location and Description

The Monsanto site occupies 530 acres of a primarily rural area in southeastern Idaho, approximately one mile north of the City of Soda Springs (Figure 1). The site is located in Sections 29, 30, 31 and 32, Township 8 South, Range 42 East of the Boise Meridian, at latitude $42^{0}40'28''$, and longitude $111^{0}35'55''$ (2).

The Monsanto site area is subject to a relatively arid climate. The average total annual precipitation is approximately 16 inches, and the average annual lake evaporation is approximately 36 inches. The plant is situated at an elevation of nearly 6,000 feet above sea level, and the yearly snowfall average is near 55 inches (2,3).

2.3 Description of Wastes and Waste Storage

Several process related wastes and by-products are generated and stored on the Monsanto plant site. A summary of waste streams and corresponding storage methods is provided in Table 1 (Figure 2) (4).

2.4 Data Use

Quality assured data collected during this investigation will be used to verify results of past sampling programs, to quantitatively characterize the potential or actual impact of past activities at the site on the environment, and to prepare a generalized description of existing risk to the public from the site. Specifically, the data will be used to determine if specific waste streams/storage methods are contributing to contamination of the local environment through ground water.

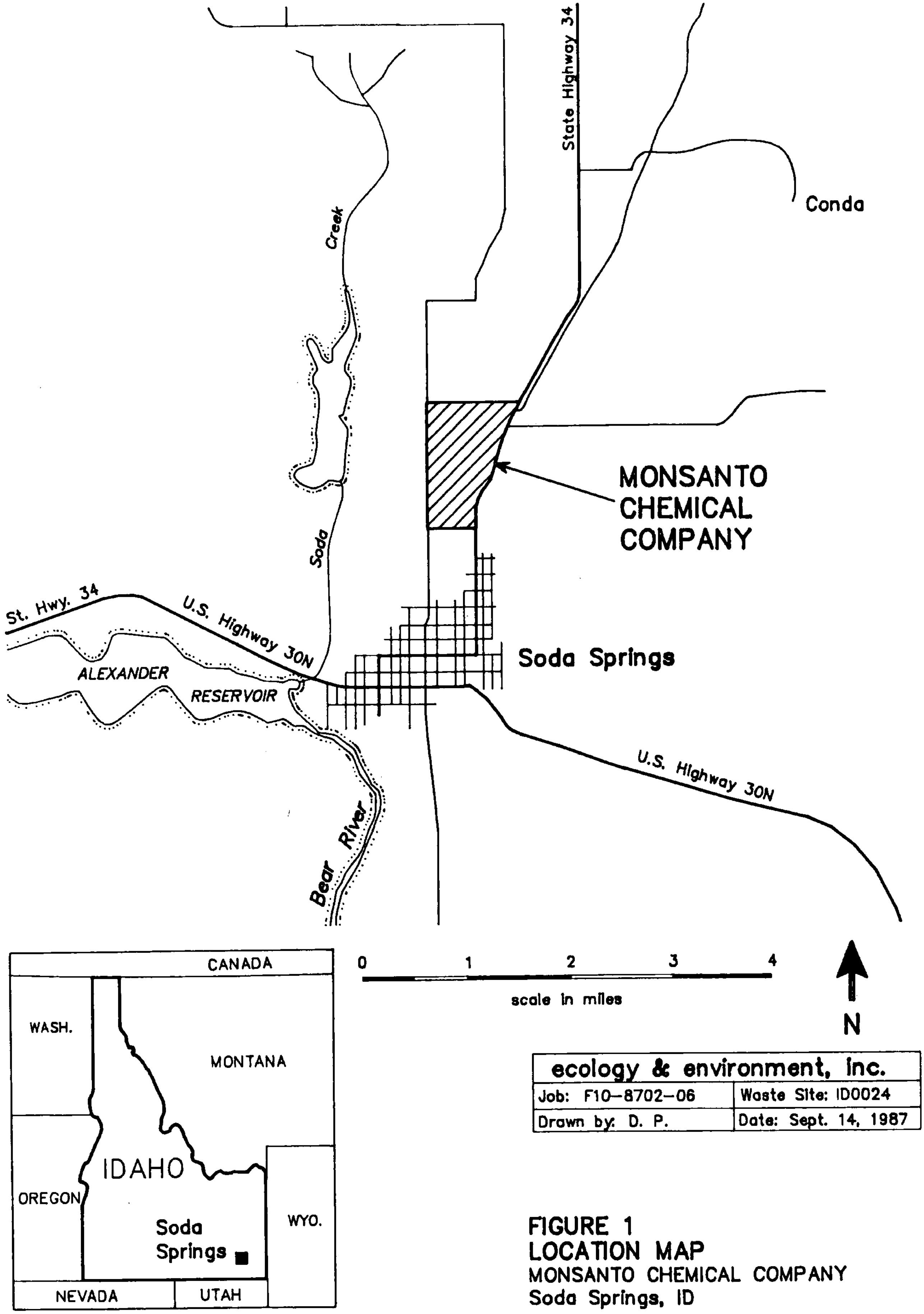
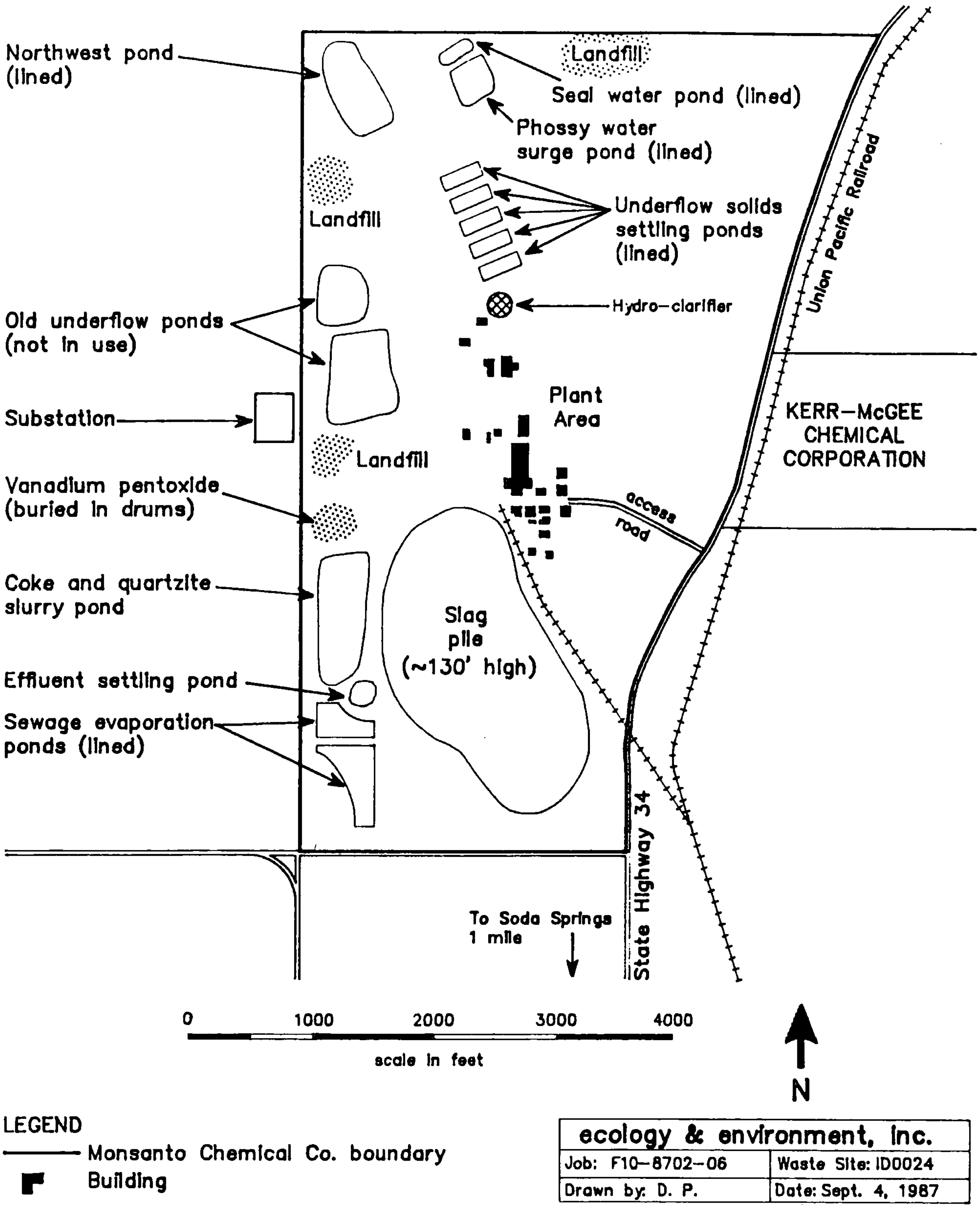


FIGURE 1
LOCATION MAP
MONSANTO CHEMICAL COMPANY
Soda Springs, ID



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Job: F10-8702-06	Waste Site: ID0024
Drawn by: D. P.	Date: Sept. 4, 1987

FIGURE 2
SITE MAP
MONSANTO CHEMICAL COMPANY
Soda Springs, ID

TABLE 1

MONSANTO WASTE STREAM AND STORAGE LOCATION SUMMARY

Waste Stream	Storage Location	Liner	Current Status
Explosion Seal Water from Furnaces	Seal Water Pond	Bentonite	Active
Displacement/process water (phossy water) from rail cars and other storage vessels	Phossy Water Surge Pond	Bentonite	Active
Coke and Quartzite Slurry	Past - Coke and Quartzite Slurry Pond Present - collected in baghouse	None	Inactive
Non-contact plant cooling water	Effluent settling pond (water is discharged to Soda Creek)	None	Active
Kiln Dust Slurry	Hydro-clarifier	Past - leaked Present - reportedly sound	
	Old Underflow Solids Ponds	None	Inactive
	New Underflow Solids Ponds	Bentonite	Active
	Northwest Pond (limited use in past)	None when used in past	Inactive
Ferrophos Slag	Pile on ground (removed regularly)	None	Active
Calcium Silicate Slag	Pile on ground	None	Active
Waste Oil	Underground tank; pumped monthly and removed from site	Concrete vault	Active

3.0 PROJECT MANAGEMENT

3.1 Project Organization and Responsibility

The following is a list of the key personnel and their responsibilities:

FIT Office Manager	: David Buecker, E&E, Seattle
E&E Project Manager	: Jeffrey Whidden, E&E, Seattle
E&E Site Manager	: Gerald Lee, E&E, Seattle
EPA Project Officer	: John Osborn, USEPA, Region X
EPA QA Officer	: W. Towns, USEPA, Region X
Data Quality Review (EPA Lab)	: Dr. J. Blazavich, USEPA
Data Quality Review (CLP Lab)	: Andrew Hafferty, E&E, Seattle
System Performance Audit	: per REM/FIT Quality Assurance Manual

3.2 Schedule of Tasks and Milestones

The proposed work schedule for the completion of this site inspection is summarized in the milestone chart presented in Table 2.

TABLE 2

MILESTONE CHART

ACTIVITY	9/87				10/87				11/87				12/87				1/88				2/88			
Work Plan/QA Preparation and Review		-	-	-																				
Equipment Procurement and Mobilization						-	-	-																
Field Work									-															
Sample Analysis										-	-	-	-	-	-	-	-							
QA Data																	-	-	-	-				
Draft Final Report*																-	-	-	-	-	-	-	-	

* Dependent upon receipt and QA of analytical data

4.0 SAMPLING PROGRAM

The Monsanto field program is composed of two principal components:

- o ground water sampling of on site wells, an off site well, and a spring; and
- o sediment and water sampling from on-site waste storage ponds.

4.1 Sampling Locations and Details

4.1.1 Well Sampling

Forty-four monitoring wells and three production wells exist at the Monsanto site (Figure 3). Approximately eight of the monitoring wells and all three production wells will be sampled during the investigation. In addition, an attempt will be made to sample off site well SWG. All wells to be sampled are screened in the upper basalt zone aquifers, which have displayed the highest contaminant concentrations in past sampling (1). Table 3 lists the wells to be sampled, depths of screened intervals, types of use, analytical parameters, and the rationale for sampling.

All well samples will be analyzed for TCL inorganic compounds, except cyanide. Cyanide is not used in processes at the plant, and is not a constituent of ore, feedstocks, or wastes generated at the facility.

The production well samples will additionally be analyzed for TCL organic compounds since they are potential drinking water sources.

4.1.2 Waste Samples

Sediment and liquid waste samples will be collected, where possible, from the following waste ponds (see Table 1 for pond uses and Figure 4 for locations):

- o Seal Water Pond;
- o Displacement/Process Water (Phossy Water) Pond;
- o Two old Underflow Solids Ponds;
- o New Underflow Solids Ponds;
- o Hydro-clarifier; and
- o Coke and Quartzite Slurry Pond.

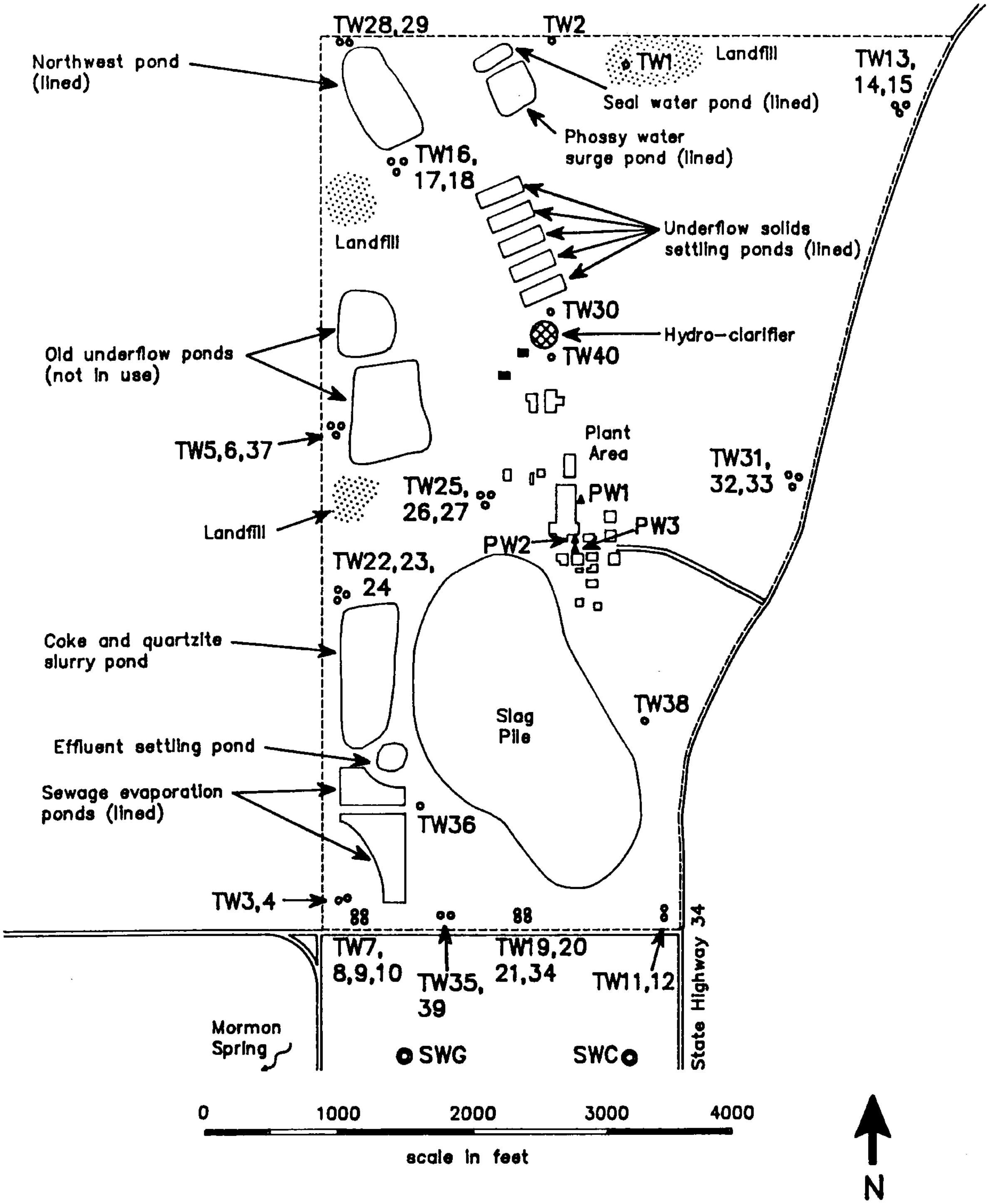
Waste samples will be analyzed for TCL inorganic compounds, except cyanide.

4.1.3 Spring Sample

Several springs from the upper basalt zone surface south-southwest of the Monsanto site. A sample will be collected from Mormon Springs which has exhibited the highest contaminant concentrations in the past (1). The sample will be analyzed for TCL inorganic compounds, except cyanide.

4.1.4 Sample Summary

A summary of sampling information for the investigation is presented in Table 4.



LEGEND

-------- Monsanto Chemical Co. boundary

Building

Monitoring well

Production well

Off-site well

Spring

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Drawn by: D. P.	Date: Sept. 14, 1987

FIGURE 3
MONITORING WELL LOCATIONS
MONSANTO CHEMICAL COMPANY
Soda Springs, ID

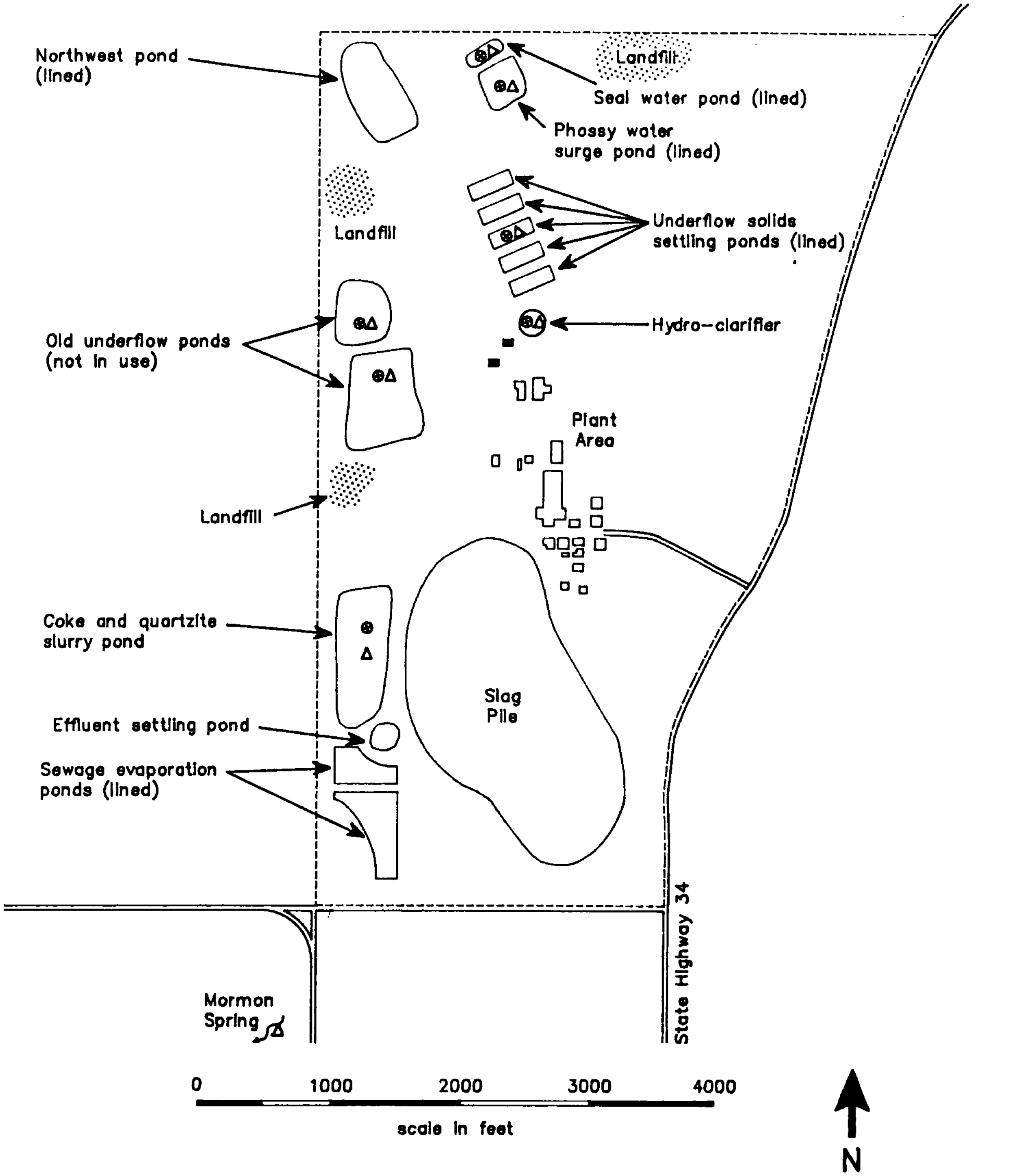
TABLE 3

SUMMARY OF WELL INFORMATION FOR SELECTED WELLS AT MONSANTO CHEMICAL COMPANY

Well Name	Depth of Screened Interval (feet)	Well Use(s)	Analytical Parameters	Rationale for Sampling
PW1	20-200+	Process/ Domestic*	Metals Ions Organics	Determine contaminant concentrations in plant well water
PW2	20-200	Process/ Domestic*	Metals Ions Organics	Determine contaminant concentrations in plant well water
PW3	20-255	Process/ Domestic*	Metals Ions Organics	Determine contaminant concentrations in plant well water
TW15	48-59	Monitoring	Metals Ions	Determine background contaminant concentrations
TW17	96-107	Monitoring	Metals Ions	Determine contaminant concentrations from Northwest Pond
TW22	104-112	Monitoring	Metals Ions	Determine contaminant concentrations downgradient of sources
TW36	48-54	Monitoring	Metals Ions	Determine contaminant concentrations downgradient of sources
TW37	93-100	Monitoring	Metals Ions	Determine contaminant concentrations from old underflow ponds
TW38	90-102	Monitoring	Metals Ions	Determine background contaminant concentrations
TW39	48-56	Monitoring	Metals Ions	Determine contaminant concentrations downgradient of sources
TW40	82-89	Monitoring	Metals Ions	Determine contaminant concentrations from old hydro-clarifier
SWG	Unknown	Domestic (Abandoned)	Metals Ions	Determine contaminant concentrations downgradient of site

* - Not necessarily used for this purpose presently

Metals - EPA TCL Metals (see Appendix A)
Ions - Selected Ions: sulfate, fluoride, phosphate, total phosphorous
Organics - EPA TCL Organics (see Appendix A)



LEGEND

- -------- Monsanto Chemical Co. boundary
- Building
- Spring
- ⊕ Proposed composite sediment sample
- Δ Proposed surface water sample

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Drawn by: D. P.	Date: Sept. 14, 1987

FIGURE 4
WASTE POND AND SPRING SAMPLING LOCATIONS
MONSANTO CHEMICAL COMPANY
Soda Springs, ID

TABLE 4

SAMPLE SUMMARY
MONSANTO CHEMICAL COMPANY

Sample Matrix	Anticipated No. of Field Samples	Blanks	Duplicate Samples	Anticipated Total No. of Samples	Sample Type	Analytical Parameters
Ground Water	3	1	1	5	Grab	TCL organics
Ground Water	13	1	1	15	Grab	TCL inorganics (except cyanide), fluoride, phosphate, total phosphorous, sulfate
Surface Water	4-7	0	1	5-8	Grab	TCL inorganics (except cyanide), fluoride, phosphate, total phosphorous, sulfate
Sediment	7	0	1	8	Biased Spatial Composite	TCL inorganics (except cyanide), fluoride, phosphate, total phosphorous, sulfate
Equipment Rinsate (bailers, spoons, mixing bowl)	1-2	0	0	1-2	Grab	TCL inorganics (except cyanide), fluoride, phosphate, total phosphorous, sulfate

4.2 Sampling Program

4.2.1 Sampling Methodologies

4.2.1.1 Ground and Surface Water Samples

Prior to the collection of any ground water samples, static water levels of all monitoring wells at the site will be measured with an electric tape. Samples will then be collected using the following process:

- At least three static volumes of water will be purged from each well. All monitoring wells except TW38 have dedicated submersible pumps in place. TW38 will be hand bailed using a stainless steel bailer or submersible pump. On-site production wells are pumped continuously and have sampling ports near the well heads. Off-site well SWG is an abandoned domestic well and will be purged using one of the above mentioned methods.

- Field parameters (temperature, specific conductance, and pH), will be measured when purging begins, and at five minute intervals until at least three well volumes and not more than five well volumes have been purged.

- Samples will be collected directly into the appropriate sample containers from the discharge ports of wells with dedicated pumps, and from the production wells. The sample from TW38 will be obtained with a laboratory cleaned, stainless steel bailer.

- An E&E Well Sampling Data Sheet will be completed for each well sampled (Appendix B).

Water samples collected from the on-site waste storage ponds will be collected by dipping the sample bottles directly into the pond water. An attempt will be made to collect samples that are free of suspended solids.

4.2.1.2 Solid Samples

Solid samples collected from the on-site waste storage ponds will be collected as biased spatial composites. The samples will be obtained using dedicated stainless steel spoons. Discrete sample aliquots from two or more locations in each pond will be homogenized in a stainless steel mixing pan. Approximately six ounces of solid material will then be placed in a pre-labelled, eight-ounce sample jar.

4.2.1.3 QA/QC Samples

A transport blank sample will be collected in the field by filling a set of sample containers with carbon free, deionized water prepared in E&E's Seattle laboratory. An equipment rinsate sample(s) (transfer blank) will be collected by pouring carbon free, deionized water over any device (bailers, spoons, mixing bowls) used to obtain or homogenize samples, and collecting the rinse water into sample containers. Rinsate samples will be collected from equipment prior to its use for sample collection.

4.2.2 Laboratory Notification

Prior to commencing sampling activities at the site, the Sample Control Center Coordinator of the Environmental Services Division (ESD) will designate the laboratory(s) where collected samples are to be sent. E&E will notify either the USEPA Region X laboratory or the designated contract laboratory through the Sample Control Center Coordinator of ESD on the days(s) on which sampling is to occur. The team will confirm the sample documentation numbers, the number of samples to be shipped and the type of analysis to be required, and will verify their arrival at the designated laboratory.

4.2.3 Sample Documentation and Handling

The potential evidentiary nature of the data collected during this site investigation requires that the possession of samples be traceable from the time they are collected until they are introduced as evidence in enforcement proceedings.

All sample data (date and time of collection, sample station, field measurements, etc.) will be recorded in a field notebook and a field documentation form. Sample custody seals will be placed on the front and back of all sample shipping containers (i.e., steel coolers) after the sample containers have been filled. Samples will be accompanied by Region X Field Sample Data Sheets and Chain-of-Custody Sheets, CLP Traffic Report Forms, and any other pertinent shipping/sample documentation information. These forms will be placed in a ziplock bag and taped to the inside of the ice chest. All sample documentation and Chain-of-Custody procedures will be followed as specified in the National Enforcement Investigations Center policy and procedures guidelines (May 1978, Revised June 1985).

All samples will be packed in accordance with National Enforcement Investigations Center guidelines (April 1980). Specific sample handling criteria are summarized in Table 5.

TABLE 5

SAMPLE HANDLING SUMMARY

Matrix	Parameter	Maximum Holding Time	Preservatives
Water	TCL Volatile Organics	14 days	Ice
	TCL BNAs, Pesticides, PCBs	5 days	Ice
	TCL Inorganics	6 months	None
	Fluoride, Sulfate	28 days	Ice
	Phosphate, Total Phosphorous	28 days	Ice
Solids	TCL inorganics	6 months	None
	Fluoride, Sulfate	28 days	Ice
	Phosphate, Total Phosphorous	28 days	Ice

4.2.4 Investigation-Derived Wastes

The types of investigation-derived wastes that will be generated during this investigation will include well purge water, and protective clothing.

Protective clothing and miscellaneous refuse (plastic, cardboard, etc.) will be double-bagged for disposal in a local landfill. Wastewater generated while purging monitoring wells will be collected into a 55-gallon drum and discharged to a lined, on-site waste storage pond.

4.3 Personnel Safety and Equipment Decontamination

Personnel safety and decontamination procedures will be addressed in the Site Investigation Health and Safety Plan.

When possible, disposable sampling and personal protective equipment will be used. When decontamination is required, equipment will be decontaminated prior to and following its use in the contaminated area. The decontamination procedure will include a consecutive series of the following washes/rinses:

- o alconox wash;
- o clean water rinse;
- o acetone rinse;
- o methanol rinse; and
- o distilled water/organic-free water rinse.

Waste sampling equipment decontamination solvents will be returned to E&E's Mobile Support Base for disposal.

5.0 QUALITY ASSURANCE PROCEDURES

5.1 Quality Assurance Objectives

The general QA objectives for this project are to develop and implement procedures for obtaining and evaluating data that can be used to assess site hazards, develop and evaluate alternate remedial actions, and be legally defensible in a court of law. In order to provide legally defensible data, it is necessary that all measurement data have an appropriate degree of accuracy and reproducibility, along with assurance that samples collected are appropriately representative of actual field conditions. All sample data will be used to assess site conditions and determine the potential impact on the public health/environment. If the site is determined to be a public threat, additional work, including more specific quality assurance procedures, may be required.

All collected samples must meet the quality control objectives (i.e., for method, detection limits, precision, accuracy, completeness) for the particular parameter requested (e.g., heavy metals) as specified by either the Contract Laboratory Program (CLP) or the USEPA Region X laboratory.

Standard Operating Procedures (SOP) have been developed that detail procedures for performing all tests at an acceptable level of quality control. The SOPs also ensure that data is intercomparable, interpretable and defensible.

5.2 Quality Assurance Checks

5.2.1 Calibration Procedures and Frequency

All field equipment used during the site investigation will be operated, calibrated, and maintained according to the manufacturers' guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and measurement will be maintained throughout the duration of the sampling program.

Preventive maintenance and check procedures for field instrumentation likely to be used during a site investigation sampling are described in Table 6.

TABLE 6

CALIBRATION AND FIELD CHECK FREQUENCY SCHEDULES

Equipment *	Regular Calibration and Maintenance Required (NOTE A)	Field Check Prior to Shipment (NOTE B)	Field Calibration Required Before Each Use (NOTE B)
Conductivity Meter	Annually	X	X
pH Meter	Daily	X	X
Water Level Indicator	Annually	X	X

* = Equipment routinely used during a site inspection/sampling
Note A = To be performed by designated regional instrument repairman
Note B = These calibrations and checks are to performed by the site field team

5.2.2 Internal Quality Control Checks and Frequency

Quality control checks for sample collection will be accomplished by a combination of the following items:

- Duplicate samples: Duplicates will be submitted in order to evaluate the precision of laboratory results. The numbers of duplicate samples required by the field sampling will be at least 10% of the total of each sample type.

- Background samples: Upgradient ground water samples will be collected from monitoring wells and at the site to determine ambient background contaminant concentrations.

- Transport blank samples/Equipment rinsate blank samples: Sample blanks will be included in each set of water samples collected during the sampling program. The blanks will consist of either carbon-free water and/or deionized water depending on the analyses required.

- Chain-of-Custody: Standard EPA protocols will be followed in order to preserve the integrity of the samples between collection and analysis (NEIC, 1985).

- Laboratory QA: Analytical procedures will be evaluated by using items such as surrogate spikes, matrix spikes, duplicates, reagent blanks, and inter-element correction checks.

5.3 Data Reduction, Validation, and Reporting

When analytical data/test data has been reduced, the method of reduction will be described in the final site inspection report.

Validation of all analytical data will be performed by senior chemists at Ecology and Environment, Inc., or at the Region X USEPA laboratory. Laboratories participating in the CLP program will be required to submit results that are supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusivley determine the quality of the data. Validity of all data will be determined based on the precision and accuracy assessments required by the USEPA. Upon completion of the review, the senior chemist will be responsible for developing a QA/QC report for each analytical package. All data will be stored and maintained according to standard document control procedures.

All field measurements will be verified by the field team leader and will be recorded in a field note book for future reference.

All raw data generated for project sampling tasks and used in the final site inspection report will be appropriately identified and collected in a separate appendix within the final report.

5.4 Performance and System Audits

The Regional EPA laboratory or contract laboratory facilities used by Ecology and Environment, Inc. personnel will be required to take part in a series of performance and systems audits conducted by the National Enforcement Investigations Center (NEIC). Laboratory Quality Control data and performance evaluations will be submitted along with analytical results for assessment by program reviewers.

Performance and system audits for E&E sampling operations will consist of on-site reviews of field Quality Assurance systems and equipment for sampling, calibration, and measurement consistent with the Zone II FIT Quality Assurance Manual (Contract No. 68-01-7347). The program Quality Assurance Coordinator will develop and conduct systems audits based on the approved project Field Operations Work Plan. Guidelines provided by the NEIC for performing audits of field activities will be followed.

If for any reason the schedules or procedures cannot be followed, a "Sample Alteration Checklist" form (Appendix B) for each element changed will be completed and this will be reviewed by the Project Manager and the QA Officer/Peer Reviewer.

6.0 REPORTS

The final report for this project will contain a separate narrative section detailing the physical/chemical data collected for the site. In addition, a discussion of the findings as they relate to the general area will be also be provided. Conclusions and recommendations will be developed for the site. An EPA 2070-13 form will be included in the final Site Inspection Report.

No separate report is anticipated to describe the performance of the data measurement systems or the data quality for this project. The final Site Inspection Report will contain a separate Quality Assurance Appendix memorandum from the E&E review staff that summarizes data quality information collected during the project. Sampling data will be summarized in tables by E&E using forms for sample documentation and reporting. These data summaries will be included in all reports when applicable.

REFERENCES

1. Golder Associates, 1985. Report on Hydrogeological Investigation, Soda Springs Plant Site (Volumes 1, 2, and 3). Prepared for the Monsanto Industrial Chemical Company.

2. USGS, Soda Springs, Idaho (15 Minute Topographic Map). 1948.

3. U.S. Department of Commerce. Climatic Atlas of the United States. 1979.

4. E&E Site Inspection, March 23, 1987.

5. Bob Geddes, Monsanto Chemical Company, phone conversations with Jeffrey Whidden, E&E, September 1987.

ADDITIONAL REFERENCES

United States Environmental Protection Agency Region X, 1985, Quality Assurance Manual for Drinking Water Programs Investigations.

_____, 1982, Technical Additions to Methods for Chemical Analysis of Water and Wastes, EPA 600/4-82-055.

_____, 1982, Methods for Organic Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057.

_____, 1980, Enforcement Considerations For Evaluations of Uncontrolled Hazardous Waste Disposal Sites By Contractors, National Enforcement Investigations Center, Denver, Colorado.

_____, 1985, NEIC Policies and Procedures, National Enforcement Investigations Center, Denver, Colorado.

APPENDIX A

EPA TARGET COMPOUND LIST (TCL)

ANALYTICAL PROTOCOLS

The standardized organic analytical methods are based on Federal Register Methods 625 (B/N/A), 608 (pesticide), 624 (VOA), EPA *Methods for Chemical Analysis of Water and Wastes* (MCAWW), and *Test Methods for Evaluating Solid Wastes* (SW-846) modified for CLP use in the analysis of both water and soil samples.

TABLE A-1

ORGANICS ANALYSES

Volatile Compounds (VOA)	Contract Required Quantitation Limits *	
	Low Concentration Water [a] (ug/l)	Low Concentration Soil/Sediment [b] (ug/kg)
1. Chloromethane	10	10
2. Bromomethane	10	10
3. Vinyl Chloride	10	10
4. Chloroethane	10	10
5. Methylene Chloride	5	5
6. Acetone	10	10
7. Carbon Disulfide	5	5
8. 1,1-Dichloroethene	5	5
9. 1,1-Dichloroethane	5	5
10. trans-1,2-Dichloroethene	5	5
11. Chloroform	5	5
12. 1,2-Dichloroethane	5	5
13. 2-Butanone	10	10
14. 1,1,1-Trichloroethane	5	5
15. Carbon Tetrachloride	5	5
16. Vinyl Acetate	10	10
17. Bromodichloromethane	5	5
18. 1,2-Dichloropropane	5	5
19. trans-1,3-Dichloropropene	5	5
20. Trichloroethene	5	5
21. Dibromochloromethane	5	5
22. 1,1,2-Trichloroethane	5	5
23. Benzene	5	5
24. cis-1,3-Dichloropropene	5	5
25. 2-Chloroethylvinylether	10	10
26. Bromoform	5	5
27. 2-Hexanone	10	10
28. 4-Methyl-2-Pentanone	10	10
29. Tetrachloroethene	5	5
30. 1,1,2,2-Tetrachloroethane	5	5
31. Toluene	5	5
32. Chlorobenzene	5	5
33. Ethyl Benzene	5	5
34. Styrene	5	5
35. Total Xylenes	5	5

TABLE A-1 (CONT.)

Semivolatile Organic Compounds (BNA)	Contract Required Quantitation Limits * Low Concentration Water[c] (ug/l)	Low Concentration Soil/Sediment[d] (ug/kg)
1. Phenol	10	330
2. bis(-2-Chloroethyl)Ether	10	330
3. 2-Chlorophenol	10	330
4. 1,3-Dichlorobenzene	10	330
5. 1,4-Dichlorobenzene	10	330
6. Benzyl Alcohol	10	330
7. 1,2-Dichlorobenzene	10	330
8. 2-Methylphenol	10	330
9. bis(2-Chloroisopropyl)Ether	10	330
10. 4-Methylphenol	10	330
11. N-Nitroso-Di-n-propylamine	10	330
12. Hexachloroethane	10	330
13. Nitrobenzene	10	330
14. Isophorone	10	330
15. 2-Nitrophenol	10	330
16. 2,4-Dimethylphenol	10	330
17. Benzoic Acid	50	1600
18. bis(2-Chloroethoxy)Methane	10	330
19. 2,4-Dichlorophenol	10	330
20. 1,2,4-Trichlorobenzene	10	330
21. Naphthalene	10	330
22. 4-Chloroanaline	10	330
23. Hexachlorobutadiene	10	330
24. 4-Chloro-3-Methylphenol	10	330
25. 2-Methylnaphthalene	10	330
26. Hexachlorocyclopentadiene	10	330
27. 2,4,6-Trichlorophenol	10	330
28. 2,4,5-Trichlorophenol	50	1600
29. 2-Chloronaphthalene	10	330
30. 2-Nitroanaline	50	1600
31. Dimethyl Phthalate	10	330
32. Acenaphthylene	10	330
33. 3-Nitroaniline	50	1600
34. Acenaphthene	10	330
35. 2,4-Dinitrophenol	50	1600

TABLE A-1 (CONT.)

Semivolatile Organic Compounds (BNA)	Contract Required Quantitation Limits *	
	Low Concentration Water [c] (ug/l)	Low Concentration Soil/Sediment [d] (ug/kg)
36. 4-Nitrophenol	50	1600
37. Dibenzofuran	10	330
38. 2,4-Dinitrotoluene	10	330
39. 2,6-Dinitrotoluene	10	330
40. Diethylphthalate	10	330
41. 4-Chlorophenyl-phenylether	10	330
42. Fluorene	10	330
43. 4-Nitroaniline	50	1600
44. 4,6-Dinitro-2-Methylphenol	50	1600
45. N-Nitrosodiphenylamine	10	330
46. 4-Bromophenyl-phenylether	10	330
47. Hexachlorobenzene	10	330
48. Pentachlorophenol	50	1600
49. Phenathrene	10	330
50. Anthracene	10	330
51. Di-n-Butylphthalate	10	330
52. Fluoranthene	10	330
53. Pyrene	10	330
54. Butylbenzylphthalate	10	330
55. 3,3'-Dichlorobenzidine	20	660
56. Benzo(a)Anthracene	10	330
57. bis(2-Ethylhexyl)Phthalate	10	330
58. Chrysene	10	330
59. Di-n-Octyl Phthalate	10	330
60. Benzo(b)Fluoranthene	10	330
61. Benzo(k)Fluoranthene	10	330
62. Benzo(a)Pyrene	10	330
63. Indeno(1,2,3-cd)Pyrene	10	330
64. Dibenz(a,h)Anthracene	10	330
65. Benzo(g,h,i)Perylene	10	330

TABLE A-1 (CONT.)

Pesticide / PCB Compounds	Contract Required Quantitation Limits * Low Concentration Water [e] (ug/l)	Low Concentration Soil/Sediment [f] (ug/kg)
1. Alpha-BHC	.05	8
2. Beta-BHC	.05	8
3. Delta-BHC	.05	8
4. Gamma-BHC (Lindane)	.05	8
5. Heptachlor	.05	8
6. Aldrin	.05	8
7. Heptachlor Epoxide	.05	8
8. Endosulfan I	.05	8
9. Dieldrin	.1	16
10. 4,4'-DDE	.1	16
11. Endrin	.1	16
12. Endosulfan II	.1	16
13. 4,4'-DDD	.1	16
14. Endosulfan Sulfate	.1	16
15. 4,4'-DDT	.1	16
16. Methoxychlor	.5	80
17. Endrin Ketone	.1	16
18. Chlordane	.5	80
19. Toxaphene	1.0	160
20. AROCLOR-1016	.5	80
21. AROCLOR-1221	.5	80
22. AROCLOR-1232	.5	80
23. AROCLOR-1242	.5	80
24. AROCLOR-1248	.5	80
25. AROCLOR-1254	1.0	160
26. AROCLOR-1260	1.0	160

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

a Medium Water Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 100 times the individual Low Water CRQL.

b Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 100 times the individual Low Soil/Sediment CRQL.

TABLE A-1 (CONT.)

c Medium Water Contract Required Quantitation Limits (CRQL) for Semivolatile TCL Compounds are 100 times the individual Low Water (CRQL).

d Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Semivolatile TCL Compounds are 60 times the individual Low Soil/Sediment (CRQL).

e Medium Water Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL Compounds are 100 times the individual Low Water (CRQL).

f Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL Compounds are 60 times the individual Low Soil/Sediment (CRQL).

TABLE A-2

INORGANIC ANALYSES

Element	Contract Required Quantitation Limits * Low Concentration Water (ug/l)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	5
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

* Specific detection limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

APPENDIX B

WELL SAMPLING DATA SHEET

ECOLOGY AND ENVIRONMENT, INC.
WELL SAMPLING DATA SHEET

TDD#: F10-__________ Site Name: __________
Date: __________ Well #: __________
Recorder: __________ Location: __________

GENERAL

TYPE OF WELL: Monitoring ☐ Domestic ☐ Commercial/Industrial ☐ Irrigation ☐
Other (specify) ☐ __________

Casing Material: __________ Constructed Depth: __________
Casing Diameter: __________ Screened Interval: __________
Elevation: __________ Measured from: Top of well casing ☐
Top of Surface casing ☐ Ground Surface ☐ Other (specify) ☐ __________
Security Cap: Locked ☐ Unlocked ☐ None Present ☐
Other Seal or Pump in Place: Yes ☐ No ☐
Physical Condition of Well (i.e., damaged, etc.): __________

FIELD MEASUREMENTS

DEPTH TO STATIC WATER: __________ Measured from: Top of Well Casing ☐
Other (specify) ☐ __________
Measuring Device: Electric tape ☐ Wetted Tape ☐ Other (specify) ☐ __________
Depth to Bottom: __________ Obstructions: __________

PURGING INFORMATION:

Pump (Type, Model): __________ Purge Rate of Pumping Method: __________
Bailer (Type, Size): __________ Checked by (bucket, timed flow, etc.): __________
Approximate total volume purged: __________

	Time	Volume Purged	Temp (°C)	pH	Conduct. (umhos)	Other	Other	Other
Final								

SAMPLING INFORMATION

ANALYSES TO BE PERFORMED:

Metals ☐ Herbicides ☐
Base/Neutrals ☐ Dioxins ☐
Acids ☐ Other (specify) ☐
Pesticides/PCBs ☐ __________
Volatiles ☐ __________
Total Cyanide ☐ __________

Cyanide Prescreen: Yes ☐ No ☐
Sulfide: Yes ☐ No ☐
Oxidizing Agents: Yes ☐ No ☐

SAMPLE COLLECTION DEVICE:

SS. Bailer ☐ Teflon Bailer ☐
Pump (specify tubing type) ☐ __________
Faucet ☐

Duplicates Collected: Yes ☐ No ☐
Splits Provided: Yes ☐ No ☐

Sample #s: __________
____

NOTES:

APPENDIX C

SAMPLE ALTERATION CHECKLIST

SAMPLE ALTERATION CHECKLIST

Project Name and Number:

____

Material to be Sampled:

____

Measurement Parameter:

____

Standard Procedure for Field Collection & Laboratory Analysis (cite references):

____
____
____
____
____
____

Reason for Change in Field Procedure or Analytical Variation:

____
____
____
____
____
____

Variation from Field or Analytical Procedure:

____
____
____
____
____
____

Special Equipment, Materials, or Personnel Required:

____
____
____
____
____
____

Initiator's Name: ____________________ Date: __________

Project Approval: ____________________ Date: __________

Laboratory Approval: ____________________ Date: __________

QA Officer/Reviewer: ____________________ Date: __________

Sample Control Center: ____________________ Date: __________